

Case 3037

***Iguanodon* Mantell, 1825 (Reptilia, Ornithischia): proposed designation of *Iguanodon bernissartensis* Boulenger in Beneden, 1881 as the type species, and proposed designation of a lectotype**

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Abstract. The purpose of this application is to designate the well known nominal species *Iguanodon bernissartensis* Boulenger in Beneden, 1881 as the type of the Cretaceous ornithopod *Iguanodon* Mantell, 1825 (family IGUANODONTIDAE Huxley, 1870). At present *Iguanodon anglicus* Holl, 1829 is the valid type species but this is known only from fragmentary and non-associated teeth which show a complete lack of diagnostic characters. It is also proposed that a virtually complete and mounted skeleton in the Institut Royal des Sciences Naturelles de Belgique, Brussels, be designated the lectotype of *I. bernissartensis*.

Keywords. Taxonomy; nomenclature; Ornithischia; IGUANODONTIDAE; iguanodons; Lower Cretaceous; *Iguanodon*; *Iguanodon bernissartensis*.

1. During the period 1822–25 Mantell and his correspondent Cuvier (Cuvier's letter to Mantell, 20 June 1824) were the first to recognise the previously unsuspected existence of gigantic herbivorous terrestrial reptiles of Mesozoic age; this recognition was based on Mantell's discovery in the Wealden (Lower Cretaceous) rocks of Sussex, U.K., of large teeth resembling the much smaller teeth of modern iguanas (see Dean, 1993). However, it was not until 1842 (p. 103) that Owen published the name Dinosauria for three Mesozoic reptiles, *Iguanodon* and *Hylaeosaurus* (herbivores) and *Megalosaurus* (a carnivore).

2. In 1825 Mantell (p. 184) established the genus *Iguanodon* for his herbivore teeth but did not mention any nominal species. He did not specify a type specimen of the genus but noted that the name was derived from the form of the teeth. He described and illustrated (1825, pp. 182–183, pl. 14, figs. 1–7) seven teeth from the sandstone of the Tilgate Forest Beds at Cuckfield, West Sussex. He mentioned also (pp. 184–185) that there were gigantic bones in the same deposits, some doubtless attributable to *Megalosaurus* Buckland, 1824 and others to *Iguanodon*. He considered that the former could be recognised by their similarity to the material described by Buckland (1824, p. 391) from Stonesfield, Oxfordshire, in which locality *Iguanodon* teeth were not known to occur. Therefore, argued Mantell, the other large bones and some vertebrae from the Tilgate Forest Beds, that could not be referred to *Megalosaurus*, could probably be assigned to *Iguanodon*. These bones and vertebrae are not identifiable in the Mantell Collection in the Natural History Museum, London.

3. In 1829 Holl (p. 84) proposed the nominal species *Iguanodon anglicum*, which thus became the type species of *Iguanodon* by subsequent monotypy (Article 69a(i)(1)

of the Code). The species was said to be based on teeth, several limb bones and vertebrae from the ferruginous Cretaceous sandstone of the Tilgate Forest in Sussex, as described by Mantell, but none of the specimens was described, illustrated or specified by its catalogue number. Holl referred to 'Philosophic. Transact. Tom. 115. pl. XIV' (the illustrations of the seven teeth in Mantell's work of 1825). Holl did not select a holotype from among these teeth. Recently Norman (1986, p. 284) corrected *anglicum* to *anglicus* because *Iguanodon* is masculine, and designated the dentary (lower) tooth depicted by Mantell (1825, pl. 14, figs. 1a, 1b) as the lectotype of *I. anglicus*.

4. Norman (1986) tentatively identified his lectotype tooth of *Iguanodon anglicus* Holl, 1829 as no. BMNH 2392 in the Palaeontology Department of the Natural History Museum in London. The tooth appears under that number (not BMNH R 2392 as cited by Norman) in Mantell's own catalogue and subsequently in the Natural History Museum register (after the purchase of the Mantell collection), where the handwritten entry reads 'The tooth of the *Iguanodon* figured as vignette in Mantell's Catal.' However, the identification of this tooth with the figures in Mantell (1825), referred to by Norman, cannot be verified absolutely; there are some differences between them. Lydekker (1888, p. 227), in his cataloguing of tooth no. BMNH 2392, does not mention Mantell (1825) but notes instead that the specimen is figured in Mantell's publications of 1827 (pl. 4, fig. 4 and pl. 17, figs. 6a and 6b) and 1833 (p. 272, figs. 4 and 5), as well as in some later works. An examination of all these figures and of tooth no. BMNH 2392 leads to the conclusion that the figures might be of several different teeth, possibly none of them being 2392. They all represent complete, fully grown dentary (lower) teeth of *Iguanodon*, somewhat worn down at their occlusal surface, but apparently differing in detail. Some are partly encased in rock, others are not; some of the drawings may have been reversed. Much depends upon the accuracy of the artist(s) who drew them.

5. In 1832 von Meyer (p. 110) proposed another nominal species, *Iguanodon mantelli*, again based mainly on Mantell's seven teeth. However, he stated that it was based also on various additional fragments described or mentioned by other workers:

(1) Cuvier (1825, pp. 350-352) had illustrated (pl. 21, figs. 28-33) six unnumbered and unspecified teeth of Mantell's; three of those figures (28-30) represented some of the teeth sent by Mantell to Cuvier while the other three (31-33) were copies of a plate supplied by Mantell from a work that he was intending to publish.

(2) Murchison (1826, pp. 103-104) had mentioned and figured (pl. 15, fig. 9) an incomplete large femur from Headfoldwood Common, near Loxwood, West Sussex, at the western end of the outcrop of the Hastings Sand. He mentioned and figured also (pl. 15, figs. 1-7) a 'lumbar' vertebra, a sacrum, four caudal vertebrae, a rib, and a specimen identified as a false rib or branch of a hyoid, all from northeast of Loxwood. All this material is incomplete, unnumbered and not specified in any way. Murchison wrote of these specimens that it was 'not impossible that some of these bones may have belonged to that animal [*Iguanodon*]'.

(3) Mantell (1827, pp. 71-79) had described (and illustrated in pls. 10-12, 14, 16-18 and 20, legend on pp. 89-92) various unnumbered and unspecified teeth, vertebrae, ribs, a chevron bone, part of a supposed femur, two metatarsals and a 'horn' (actually a thumb spike), all except the chevron being subsequently listed by von Meyer.

6. The nominal species *Iguanodon anglicus* Holl, 1829 and *I. mantelli* von Meyer, 1832, being based in part upon the same material, are subjective synonyms. The species described by von Meyer is much better known than that of Holl, which had been proposed in a relatively obscure publication; in consequence, for more than 150 years *I. anglicus* remained unknown to most authors, and *I. mantelli* was generally regarded as the type species of *Iguanodon* (see, for example, Lydekker, 1888, p. 218). However, both nominal species are clearly indeterminate.

7. The situation was further complicated when the first associated remains of *Iguanodon* in some quantity were found at Maidstone, Kent, in 1834; Mantell's friends bought the specimen for him but the first adequate description was by Owen (1851, pp. 105–118). The specimen is now in the Natural History Museum, London. It still bears its original Mantell catalogue number 3791 but does not appear in the Natural History Museum register, where the number 3791 (although within the block of numbers allocated to the Mantell Collection) is blank. Until recently it was generally regarded, although incorrectly, as the type specimen of *I. mantelli* von Meyer, 1832: first by Hulke (1876, p. 364), then by Dollo (1882, p. 170). Lydekker (1888, p. 219: 'This specimen may be taken as the type of the species'), Woodward & Sherborn (1890, p. 241) and many others. Swinton (1970, p. 208) recorded, without comment, that Lydekker regarded '3791' as the type specimen. Indeed, the Maidstone *Iguanodon* is still displayed as the 'holotype' of *I. mantelli* in the present exhibition in the Natural History Museum, London. The specimen, which is now referred to *Iguanodon atherfieldensis* Hooley, 1925 (see Norman, 1993, pp. 236–237 and para. 9 below), is from a much higher horizon (Kentish Rag = Hythe Beds of the Lower Greensand = Aptian) than that of most other *Iguanodon* specimens from southeast England, the vast majority of which come from various levels in the Wealden; Mantell's teeth, for example, are from the Hauterivian.

8. Mantell's (1825) seven syntype teeth (the lectotype of *I. anglicus*, designated by Norman, 1986, and six paralectotypes) are highly unsatisfactory as type material for the genus *Iguanodon*. The illustrations have been identified with actual specimens only tentatively and there is no evidence of their provenance (except in so far as, if the identifications are correct, some of them were listed by Lydekker in 1888 as being from Cuckfield, West Sussex); it is therefore impossible to determine whether or not they are all from the same locality. Likewise, since all the specimens are isolated teeth, it is uncertain as to whether they belong to the same individual or even to the same species. In any case, the several known species of *Iguanodon* have no features of the teeth by which they might be distinguished one from the other, and these teeth of *I. anglicus* could be conspecific with any of them. In brief, these teeth are indeterminate specifically, and the name *I. anglicus* must be considered a nomen dubium. No other material has ever been referred to the species, nor could that be done. In these circumstances the appropriate course of action is to designate a new type species for the genus, after which the inadequacies of the *I. anglicus* material will be irrelevant.

9. There are two common and sympatric supposedly distinct species of *Iguanodon* in the Weald of southeastern England and in Belgium, *I. bernissartensis* Boulenger in Beneden, 1881 (p. 606) and *I. atherfieldensis* Hooley, 1925 (p. 3); both are represented by almost complete articulated skeletons (many such in the case of *I. bernissartensis*; see De Pauw, 1902, and Norman, 1987, for an account of the 1878 discovery, recovery, preparation and display of specimens in the Institut Royal des Sciences

Naturelles de Belgique, Brussels). The deposits in which they occur abundantly (Bernissart in Belgium, Ockley in Surrey, and the Isle of Wight) are of Barremian to Lower Aptian age, a little younger than the Hauterivian 'Tilgate Grit' of Cuckfield in which *I. anglicus* was found. The existence of two distinct osteological forms at Bernissart had been observed by Boulenger (1881, p. 605); Nopcsa (1915, 1918, 1929) noted that several deposits have yielded what appear to be two species of ornithomimid dinosaur and suggested that in each case (including that of *Iguanodon*) the two might actually represent sexual dimorphs of a single biological species, but Norman (1986, p. 362) believed that the status of *I. bernissartensis* and *I. atherfieldensis* cannot be resolved. In these circumstances it seems prudent to choose the senior of the two nominal species, *I. bernissartensis*, as the type species of *Iguanodon*.

10. Beneden (1881, p. 601) referred to 'une vingtaine d'individus de différentes grandeurs ont été mis au jour' from the Bernissart Wealden deposits in the Institut Royal in Brussels. Boulenger (in Beneden, 1881, p. 606) described the anatomy of the pelvis of *Iguanodon* and considered that the greater number of sacral vertebrae (six) in the Bernissart fossils, compared with the five that Owen had demonstrated in *I. mantelli* von Meyer, 1832, merited the establishment of a new species, *I. bernissartensis*. No particular specimens were mentioned. Dollo further described the species in 1882 (p. 177, pl. 9, figs. 3–4) and in a series of 25 additional papers between 1883 and 1923. In more recent times detailed studies have been made by Norman (1980, 1986).

11. Among the 26 skeletons of *Iguanodon bernissartensis* from Bernissart now known, the first virtually complete and articulated specimen (specimen Q; catalogue no. IRSNB 1534) to be mounted and displayed in the Institut Royal in Brussels has traditionally been considered to be the type. This specimen was cited as the holotype by Casier (1960, p. 126, pls. 5, 6, 11; 1978, p. 158, pls. 5, 6, 11) and by Norman (1980, p. 13, figs. 61, 63–65, 67–72; 1986, pp. 366; 1987, p. 71) but, under Article 74b of the Code, it would be the lectotype. De Pauw mounted the skeleton during 1882–1883 and sent a drawing of it to several eminent naturalists (see De Pauw, 1902, p. 24, pl. 6). The specimen was referred to by Dollo (1883a, p. 85) and the drawing was published by De Pauw (in Dollo, 1883a, pl. 5) and it has been almost completely internationally recognised as the type since that time. In a 1925 posthumous publication, Hooley (pp. 11, 51) referred to a further specimen figured by Dollo (1883b, pl. 9) as the 'type-skull'. This is skeleton N, catalogue no. IRSNB 1535 in the Institut Royal, which is less complete and embedded on the right side in matrix (see Casier, 1960, p. 123, pl. 12; 1978, p. 155, pl. 12; and Norman, 1986, p. 366). It was assembled for display in 1905. Hooley's action constitutes a (possibly inadvertent) lectotype designation but to accept it would be destabilising and we now propose that skeleton Q, no. IRSNB 1534 in the Institut Royal des Sciences Naturelles de Belgique, be fixed as the lectotype of *I. bernissartensis*.

12. The International Commission on Zoological Nomenclature is accordingly asked:

(1) to use its plenary powers:

(a) to set aside all previous fixations of type species for the nominal genus *Iguanodon* Mantell, 1825 and to designate *Iguanodon bernissartensis* Boulenger in Beneden, 1881 as the type species;

- (b) to set aside all previous fixations of type specimens for the nominal species *Iguanodon bernissartensis* Boulenger in Beneden, 1881 and to designate skeleton Q, catalogue no. IRSNB 1534 in the Institut Royal des Sciences Naturelles de Belgique, Brussels, as the lectotype;
- (2) to place on the Official List of Generic Names in Zoology the name *Iguanodon* Mantell, 1825 (gender: masculine), type species by designation in (1)(a) above *Iguanodon bernissartensis* Boulenger in Beneden, 1881;
- (3) to place on the Official List of Specific Names in Zoology the name *bernissartensis* Boulenger in Beneden, 1881, as published in the binomen *Iguanodon bernissartensis* and as defined by the lectotype designated in (1)(b) above (specific name of the type species of *Iguanodon* Mantell, 1825).

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